D Y S E N T E R Y.

-By-

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In this thesis dysentery as seen in S. Africa is specially referred to.

This disease is very prevalent in this country and is responsible for a large number of deaths each year.

During the recent war it proved very fatal, causing more deaths than any other disease, with the exception of Enteric Fever.

The definition of dysentery is not easy, as the term has been somewhat loosely applied by many authors to any case in which blood and mucus are passed in the stools, whether the cause of this condition be from the specific disease or from other conditions such as syphilis, typhoid, tuberculosis etc. which may produce similar effects.

I propose to define dysentery as a specific primary colitis, characterized by inflammation of the mucous membrane of the large intestine, usually followed by ulceration and sometimes by sloughing

of portions of this inner coat; this condition being associated with severe diarrhœa, with the passage of blood and mucus, and frequently of shreds of membrane, and with abdominal pain and tenesmus.

General Etiology.

Dysentery is a very wide spread disease occurring in almost every country, but it is a rare disorder in temperate climates, and then is usually of a mild type except in certain epidemics and in crowded institutions, especially in lunatic asylums.

In the tropics this disease is much more prevalent, is of a more severe type and is the cause of a large mortality each year.

It is one of the great camp diseases and has proved very fatal in every war.

In South Africa during the recent campaign this disease occurred largely in standing camps especially where there was much dust, imperfect sanitation and bad water supply, it was not nearly so prevalent amongst the troops in the field though their water supply was often very bad.

It is endemic in this country and is usually most prevalent during the summer, which is the rainy season, occurring chiefly in places where the sanitary arrangements are defective and where the people live on indifferent food, but it also affects the higher classes where the general conditions are good. It is no doubt often due to the impure

water supply and this is borne out by the fact that the disease is usually met with in the wet season when the rain has washed all the surface refuse into the water.

On the other hand there are almost no instances on record in this country where many individuals with the same water supply have become infected and it is usually very difficult to trace the source of this disease to any water supply.

Though there are no good instances of an outbreak of dysentery being due to a water supply in S. Africa yet there are several striking examples which have occurred in other countries. Davidson gives the following -

In 1870 at Metz dysentery broke out in one regiment while the rest of troops were healthy. It was found that the wells supplying this regiment with water were contaminated with fæcal matters from adjacent latrines. The spread of the disease was arrested when these wells were closed.

In 1881 the same thing occurred with the same result when the wells were closed. Surgeon Oakes and Fayrer at Calcutta report similar instances. By many authors dysentery is said to occur under much the same conditions as malaria and to be of a similar nature to and frequently associated with that disease. In parts of the Transvaal particularly in Pretoria and Johannesburg malaria is almost

unknown and yet dysentery is very common - apparently there is no connection in this country between the two diseases, though of course malaria may be a predisposing cause. Flies, I think are frequently a source of infection, especially in a country like this where there is no water system of drainage and where there is a large amount of excreta and refuse within a short distance of the houses. Flies settle on this refuse in large numbers and thus readily convey the infection to articles of food.

Predisposing and exciting causes.

In sound health the pathogenetic organisms can apparently pass through the alimentary canal without attacking the tissues and giving rise to the disease. So long as the mucous surface is sound and vigorous it probably has the power of protecting itself against such organisms, unless they are in very large numbers and of great virulence. It is probable that only in conditions where the vitality is lowered, such as catarrhal troubles, constipation (a very common predisposing factor) chill, bad food, the weakness following diseases with high temperature especially Enteric Fever in this country, that the dysentery germs can overpower the natural protective agencies. In this connection it is probable that this lowered vitality is the cause of the prevalence of the

disease amongst lunatics.

Influence of age and sex. Dysentery occurs equally at all ages and affects those of either sex. In our hospital records it has apparently been more fatal in the female sex.

It affects the native races as much as the European and is frequently very fatal among the coloured population.

Bacteriology.

There are two distinct classes of micro-organisms which may cause dysentery (1) The Bacillus dysenterius of Shiga and its allies.(2) The Amœba dysenteriæ first described by Lambl in 1859.

In South Africa nearly all the cases are due to the bacillus. This has been proved by several observers. Col. Birt R.A.M.C., who has done a great deal of work in connection with the bacteriology of this disease, has only found the amœba in one or two instances but has been able to isolate the bacillus in almost every case. Bruce and Washbourne both failed to find the amœba, Beveridge discovered them only 3 times out of 147 cases, but in nearly all these was able to isolate the bacillus.

Bacillus Dysenteriæ.

In 1897 Shiga in Japan isolated a bacillus from dysenteric stools with special characteristics.

Flexner, Barker, Strong, Firth and many other observers have since isolated a bacillus with many similar but a few special characteristics.

Characteristics of Shiga's Bacillus.

It is a short thin rod varying in length from 1-3 M and is allied to the typhoid and colon groups. It is stained by the ordinary basic dyes but decolourises by Gram's method. Its ends are rounded, it is usually described as non-motile and without flagellæ, but in several specimens shown me by Col. Birt cilia were quite distinctly visible and this observer states that they are invariably present though very difficult to make out.

It grows well at 37·C on all ordinary culture media preferably in the presence of oxygen.

On Agar the growth is not characteristic and resembles that of the B. Typhosus, it is moist grey and slightly opalescent.

On a gelatine slope the growth is a fine pearly pellicle with slightly serrated margins rather like that of the B. Typhosus. The gelatine is not liquified. In peptone broth it causes uniform turbidity but does not form any pellicle. After a few days a floculent deposit forms and the reaction of the media becomes slightly acid. Indol is not produced. The growth on potato is usually moist, colourless and glistening and is

barely visible.

In milk it grows well and produces no clotting. In sugars the bacillus does not produce any gas but it produces a small amount of acid in glucose.

Viability when dried on pieces of rag or placed on dry soil the bacillus will remain alive from 12-22 days according to the temperature. In ordinary water it is recoverable up to 22 days at a temperature of 22 C. On bread crumbs it will live 6 days. From these observations it will be seen how easily the bacillus can be spread by infected water, dust or flies. Since Shiga's discovery, there have been many investigators. Two years later Krux obtained this organism in an epidemic in Westphalia. Flexner found a very similar organism, having however certain special cultural peculiarities, in the Phillipines, Strong and Musgrove confirmed Flexner's work.

In Europe Drigaloki, Muller, Pfuhl, Rosenthal, Docer and Vaillard have each found a bacillus in the respective outbreaks of dysentery investigated by them.

In South Africa Bruce, Beveridge, Washbourne and Birt have isolated an organism and proved its identity with Shiga's bacillus. Though the bacilli isolated by each of these observers have very similar morphological characteristics, still the

several strains - Shiga's, Flexner's, Strong's and Musgrove's etc. differ slightly in culture growths, and in their agglutination reactions to sera of infected animals.

The bacillus is nearly always agglutinated by the serum of an affected person, this has been shown by numerous observers. The serum of one of Col. Birts cases in Pretoria reacted in a 600 fold dilution.

Whilst fully admitting the value of the constant presence of this bacillus in the stools of persons suffering from dysentery and of the fact that it is usually agglutinated by the serum of the affected person as evidence of specific patho-genicity, still absolute proof is only afforded when the disease has been produced experimentally by means of pure culture of the organism.

Until Vaillard published his results, the various experiments had not given any very definite results. He however during an epidemic at Vincennes succeeded in producing in rabbits, dogs and pigs a lesion of the large intestines, very similar to that in man, by the subcutaneous injection of these bacilli.

He thus demonstrated the selective affinity of this organism for the mucous membrane of the large intestines. Other observers eg Firth etc. have confirmed these results.

As to the pathogenic effects of this bacillus on man the evidence is rather scanty.- Strong reports the case of the Fillipino prisoner under sentence of death who was induced to swallow a culture of this bacillus, isolated in Manilla, who suffered from the usual symptoms.

Flexner's assistant accidentally swallowed some of a broth culture and within 48 hours he had an acute attack of dysentery.

Kruse reports two cases following accidental infection. Shiga had $\frac{1}{12}$ of an Agar culture suspended in bouillon and killed by heat, injected but had no symptoms of dysentery; his blood however showed active agglutination of the bacillus 10 days after.

Recently the serum of horses minimised against the bacillus of Shiga has been used in the treatment of dysentery with markedly favourable results - this will be referred to subsequently.

In order to isolate this bacillus of Shiga, use an evacuation if possible in the early stage of the illness, in which there is little faecal matter. Select a fragment of mucus, wash it with warm normal saline solution and then shake up with sterile broth.

Plates are now made by placing one or two loopfuls in liquified and cooled Drigalski and Conradi's

medium or in neutral litums lactose agar, after 20 hours incubation at 37·C Bacillus coli communis colonies will appear. These are noted and the plates are incubated for another day. Many new colonies will now be seen which are more transparent and smaller than the first. These are innoculated into Docer's medium consisting of mannite nutrose and litums. The dysentery bacillus leaves this unchanged while the Bacillus Coli Communis reddens and clots it.

Cultures are then made from the unaltered tubes on different media by which the organism is isolated and its identity is established.

For these notes on bacillus of Shiga I am indebted to the writings of Col. Firth R.A.M.C. Journal Dec. 03, to Col. Birt, South African Medical Record September 1904 and to notes from one or two other authors. I have done no original work in this direction myself.

Amoebic Dysentery.

This form of dysentery is almost unknown in South Africa - I have seen no cases of it myself but it is prevalent in Egypt, India, the United States and the tropics generally. It is caused by the Amoeba Dysenteriae.

Lambl first described this organism in 1859, Loo wrote on them later.

In the stools from cases of the endemic dysentery of Egypt, Kartulis found them and described them fully - he also found them in the Liver abscesses.

Osler in 1900 found them in a case from Panama and subsequently in many other cases in the United States.

To find the amœba - a small piece of mucus should be chosen from a recently passed stool and examined with $\frac{1}{6}$ objective. The Amœba will be distinctly seen exhibiting their characteristic activity if the evacuation be quite fresh and has not been mixed with urine for long. They are frequently in large numbers.

They are from 15-20 M. in diameter and consist of a clear outer zone.- the ectosarc and a granular inner zone, the endosarc, and contain a nucleus and one or two vacuoles.

The relative frequency of this form in other countries is shown by the figures of the U.S. Army in Manilla 1328 cases 561 amœbic.

This form of dysentery will not be discussed subsequently as I have had no opportunity of studying it. It is of a somewhat different type, is more apt to relapse and become chronic and to be followed by abscess of the Liver.

Morbid Anatomy.

On opening the large bowel the appearances are characteristic: The mucous membrane is extensively destroyed and the walls have a sodden appearance often with a variety of colours. Ulceration in different stages is seen and occasionally all the coats are almost gangrenous and black in various portions of the gut. In those who die at an early stage (acute severe cases) the interior of the gut is covered with a layer of blood stained mucus easily removable by washing, and beneath this is the congested mucous membrane. This frequently presents a mammilar or nodular condition as if a layer of peas were embedded underneath it. The infiltration may however assume a more elongated shape or several nodules may become gangrenous, and then the interior of the gut may present the appearance of being lined with black currants.

If the tops of these nodules have sloughed away ragged ulcers of various sizes and shapes with depressed sloughy grey bases and undermined and ragged edges are left. These ulcers may be of different colours, a deep red, grey, green or almost black.

The sloughs usually come away in small pieces but sometimes, owing to extensive undermining of the mucous membrane, considerable portions become

detached forming larger sloughs which may even, in rare cases, be mistaken for Diptheritic casts of the bowel.

Sometimes the ulceration may be so extensive that only islands of mucous membrane are left - The muscular coat becomes involved and may almost entirely disappear in severe cases, but to make up for the loss of these two coats the connective tissue is usually much increased and thickened and this is the reason that dysenteric ulcers so rarely perforate.

In the series of post mortems at this hospital in only 2 cases has there been a perforation of the large intestine.

This increase in the connective tissue is usually very well marked and the large intestine may, instead of weighing the usual 16 oz. scale 30 oz.

In some cases of very advanced dysentery the necrosis may have extended through all the coats and the whole wall may be in a black gangrenous condition and it is then impossible to remove the gut without tearing it.

Patches of localized peritonitis may be found over some of the ulcers.

In several cases the ulceration was neither very deep nor extensive and very severe symptoms may be present with only, comparatively speaking, trivial morbid changes.

The large intestine is usually the only part of the bowel affected; in this hospital I have never seen definite ulceration of the ileum, though sometimes the mucous membrane has been congested.

Col. Birt describes ulcers of the ileum in several necropsies. The parts chiefly involved are as a rule the transverse and descending colons, the sigmoid flexure and rectum. This distribution of the ulceration is different from that found in amoebic dysentery, for in the latter form the ulcers in the early stages of the disease are found in the caecum and ascending colon.

In the more chronic forms the ulcers are usually smaller and present a more punched out appearance, with thickened and less ragged edges. Parts of the bowel, and even the ulcers themselves, may be pale and anaemic - other parts are very much congested. The increase in the connective tissue in chronic dysentery is often very well marked and the contraction of this is the cause of stricture of the large intestines which is one of the sequelæ of dysentery - very rarely seen in this country.

Liver abscess is rather a sequela than a complication, and is therefore rarely met with in post mortem examinations of recent cases. It does not often occur in the bacillary form and is much more common in amoebic dysentery.

One point of interest in dysentery post-mortems

is the small size of the spleen, and it, as well as the other organs, is usually sterile, dysentery is therefore not a blood infection. The bacillus of Shiga has, as far as I know, never been isolated from a liver abscess the pus of which is usually sterile. In this respect the bacillus differs from the amœba which is frequently found in liver abscesses. Dysentery frequently follows enteric fever and in several necropsies recently healed enteric ulcers were found in the ileum. These must not be confused with the dysenteric ulcers.

Classification of the forms of dysentery.

As has already been stated in discussing the bacteriology of this disease, there are two entirely different forms namely - Amœbic Dysentery and Bacillary Dysentery, and these present distinct clinical as well as pathological differences.

Bacillary dysentery = due to the bacillus dysenteriæ.

Clinical Classification of Cases.

There have been a large number of classifications for dysentery. Frank, Head and Gemmel adopt the clinical classification of acute sthenic, acute asthenic and chronic; Manson Catarrhal, Ulcerative Gangrenous and Diptheretic; Sheube Catarrhal gangrenous and chronic; ~~Davidson sthenic or asthenic types~~ Davidson sthenic or asthenic types. These latter classifications are based more or less in the post mortem appearances,

and in my opinion are only differences of degree of the same disease.

In this country cases of the mild or catarrhal type as a rule get well in a few days and practically never die, though a case which appears mild at first may in exceptional instances become severe. In these mild cases there is I think nothing more than a severe catarrh of the large intestine with perhaps a very small degree of ulceration.

In the severe or as it is called ulcerative type, of which a considerable proportion prove fatal, there is always ulceration, more or less wide-spread, and even areas of gangrene in exceptionally severe cases.

In Enteric fever, a disease similar in that it is caused by a bacillary invasion of the intestine, there is no attempt made to base a classification in the degree of infection of the bowel, though in the post-mortem room there is almost as great a variety both in the number, depth and appearance of the ulcers found, as there is in dysentery. Clinically therefore the type of disease is best simply described as mild or severe.

Clinical Features of the severe Type.

The onset is usually preceded by diarrhœa and slight abdominal pain which may last for two or three days, or perhaps for only twelve hours. In other cases, especially the more severe, the onset is much more sudden and the first symptoms

are pain in the abdomen with one or two diarrhœic stools, followed almost at once by the characteristic symptoms.

Symptoms.

The characteristic symptoms are abdominal pain, griping, tenesmus and the peculiar stools. The stools are of a peculiar fœtid odour, and at first clear gelatinous mucus is passed, mixed with fæcal scybalæ but this soon becomes streaked with blood and, within twenty four hours as a rule, the motions consist entirely of blood with mucus intermingled. In a mild case within one or two days the motions become more scanty and consist only of a little blood stained mucus with very little fæcal matter, if the case progresses favourably the motions become less frequent, brownish, the mucus more opaque and gradually more fæcal matter appears.

The motions are in severe cases almost continuous, the patient being unable to leave the bed-pan - there may be as many as 200 in the 24 hours.

They are very small and consist only of about a teaspoonful of blood streaked mucus with no fæcal matter.

In the mild type the motions are not nearly so frequent and average only 12 or 18 in the 24 hours.

Abdominal pain is an almost constant feature of the disease, it is usually slight at first, but

within 24 or 36 hours may become very severe and is accompanied by agonising griping and tenesmus.
The suffering is sometimes very great - the patient becomes wet with sweat, groaning and even delirious, exhausted and quite unable to attend to himself in any way and has incontinence of urine and fæces.
The temperature is not usually high, for the first 24 hours it may be 102° F. to 103° F. but after this period it usually comes down and ranges from 99 to 100 or stays normal. In a few more acute cases however the temperature keeps high and ranges from 101° to 102°-5° F. during the whole attack, this is especially the case I think when there are very large intestinal ulcerations and consequently a large absorption of toxines. Many of these cases prove fatal.
The tongue is thickly coated, often dry and as the disease progresses it becomes glazed and red.
Nausea and vomiting are uncommon features, but they may be present. Thirst is usually present and the patient is constantly asking for cold drinks. The urine is usually scanty and high coloured.
In bad cases hiccough may be very persistent, it is always a symptom of serious import as it is very difficult to check and is very weakening.

Course and duration of the disease.

In the severe type the motions, usually at first about 50 or 60 in 24 hours, gradually get less

and more faecal matter gradually appears, the tenesmus and pain become less severe and at the end of about 10 days the patient is much more comfortable passing about 8 or 10 motions in 24 hours, and able to get a good deal of sleep. The temperature comes down if it has been high. By about the end of the second week or the beginning of the third, the stools become clear and the patients convalescent.

On the other hand, in fatal cases the stools continue to be scanty and consist only of blood and mucus and do not decrease in frequency. The pain and tenesmus become very severe, the patient becomes delirious exhausted and has incontinence of urine and faeces. He becomes rapidly worse with a quick running pulse and death may ensue within 3 or 4 days or more frequently in the second week of the disease.

In this hospital the average number of days in which patients continued to pass blood and mucus was 10, but of course in many instances the patients had been suffering for 6 or 7 days before admission.

Convalescence is usually rapid as is shown by the fact that the average time for a patients' stay in hospital with a severe attack is only 21 days. In the mild type with a temperature for only the first 24 or 36 hours, the blood and mucus decrease rapidly, frequently within 36 hours of admission to hospital. The stools are as a rule free from mucus and approaching normal type about the 6th or 7th day and con-

valescence is very rapid.

The following is a good example of an acute attack of the severe type of dysentery. The description is taken from the notes of a medical man who was a trooper in the Imperial Yeomanry during the early part of the recent war.

"One evening after a long days march, I noticed a slight pain in the abdomen and that the bowels were somewhat relaxed but did not attach any importance to this as I had taken an aperient early that morning.

During the night diarrhœa started but without much pain and only a little straining, a motion being passed about every half hour.

1st. day: Next morning, having a day in camp, I was horrified to find on going to the latrine that the stools consisted almost entirely of blood. I reported sick and was ordered Ol Ricini ℥ ℸ and Tr Opii m XV. The motions continued all that day every half hour, in the afternoon the blood became less but the amount of mucus increased and the straining and pain in the abdomen became worse. I passed a very restless night with no sleep and by next morning the motions had increased in number to one every quarter of an hour. They were not so large but the pain and tenesmus were very much worse and I was quite unable to perform any duties.

On the 2nd day: I reported sick, temperature was 103° and I was removed to a cottage at once. There was only one orderly to attend about 15 patients and the medical officer only visited me once in 24 hours - sometimes not so often. Temperature was never taken. No attempt at medicinal treatment was made. Motions became almost continual, one every five minutes and now consisted only of a very little mucus, streaked with blood. The pain became very severe, during the straining at stool it was agonising and felt as if a red hot hand were grasping the bowels and pulling on them. It was so severe that, though a strong man I fainted at intervals. Pain between motions not so severe though it was continuous. The tenesmus was very marked, as soon as one motion had been passed, I felt as if I must pass another at once.

I became very much exhausted by the continual motions, constant straining and want of sleep. The only relief for 5 days and nights was the intervals of unconsciousness when I fainted and twice for an hour after a third of a grain of morphia.

Almost no food was obtainable as we were in a state of siege - only one cup of milk per day and a little barley water. Bovril was supplied but the pain almost immediately after drinking it was so acute that I was afraid to swallow it, it seemed to run right through me and increased the pain and tenesmus. Condensed milk was tried, but could not be taken

owing to the nausea it caused.

Brandy ℥ss ~~ss~~ 3 hourly was allowed and I always felt benefitted by it.

Practically no medicine only gr $\frac{1}{3}$ morphia twice as already stated.

On the 6th day I began to feel better, the stools became fewer, there was less straining and on the 6th night I had my first sleep.

After this I improved rapidly and by the 10th day all symptoms of dysentery had disappeared. I was reduced in the 6 days from a healthy man weighing 12 stone to an invalid weighing 9½ stone and too weak to stand up.

Hunger during convalescence was very great and I was put on a diet of tinned beef and hard biscuits, but in spite of this I had no relapse and made an uninterrupted recovery.

This case is I think of some interest as it illustrates clearly the duration and course of a sharp attack of the severe form of dysentery and it also shows that dysentery is frequently self limited and gets better even if no medicinal agents are employed.

Chronic Dysentery.

In this country where the disease is almost entirely due to the Bacillus, chronic dysentery is, comparatively speaking, rarely met with.

Occasionally however cases do become chronic especially those which are neglected and they are usually

very troublesome and difficult to cure.
The motions vary in number from 3 to 6 in the 24 hours and there is a little blood and mucus in them but this may disappear for two or three days and then return. The temperature is normal and the patients are, as a rule, fairly well nourished and may even put on weight for a time after recovery from the acute attack.
There is usually slight straining and a feeling of discomfort in the abdomen with occasional attacks of pain.
These cases may last for months but eventually in nearly every instance they improve and get perfectly well. Sometimes however they are very obstinate and do not improve till a complete change of climate is resorted to.

Complications of Bacillary Dysentery

Hæmorrhage Whenever large sloughs separate haemorrhage may occur. It is however much less common than would be expected from the size and depth of the ulcers and is rarely seen in large amounts, I have never seen a fatal result due to it, though in some cases it is an important factor in producing the exhaustion and anaemia.
It occurs in about 3 or 4 per cent of the cases.

Perforation

This is of course a fatal complication, but fortunately very rarely met with. It may occur in those cases where parts of the bowel are gangrenous.

As already mentioned the reason that perforation is so very rare is that the large increase in the amount of connective tissue of the coats of the bowel render it much thicker and so more impervious. In our post mortem exaninations there have only been two instances of this accident - they were both gangrenous.

Local Peritonitis may arise due to inflammation spreading from the large intestine. If this occurs in the region of the caecum a perityphlitis may develope. It is not common and is marked by an increased abdominal tenderness more or less localized at first, rigidity of abdomen, thoracic breathing, quick pulse and perhaps a rise of temperature and usually there is vomiting in addition.

Interssusception is a very rare occurrence met with, especially in children, practically never in adults.

Rheumatic pains and effusions into joints

This is a rare affection and one of no serious import as it never leads to any permanent damage and usually disappears very soon. The joints especially the knee become painful and swollen - a very similar condition to that met with in sub acute rheumatism. There have been only about 5 cases recorded in this hospital.

Liver Abscess is rather a sequelæ than a complication of dysentery, as it is practically never met with during the attack.

In India and the tropics it is of very common occurrence but in these countries it is associated with amoebic form, amoeba being frequently found in the pus and walls. In this country where dysentery is almost entirely due to the bacillus it is a very rare sequela of dysentery. In this hospital during the last 3½ years, there have only been 9 cases of liver abscess though over 300 cases of dysentery have been treated. In only 4 of them a history of dysentery was elicited and it is questionable even in these 4 if dysentery was the cause of the abscess or only accidental, for quite a large proportion of the European population here has suffered from dysentery some time. The bacillus has never been isolated from these abscesses.

The pus is usually sterile or may contain Streptococci and Staphylococci.

Malaria is mentioned by many writers as a frequent complication or concomitant of dysentery.

In this part of the Transvaal malaria is a very rare disease and I have never seen a case of dysentery complicated by it.

Weir Mitchell, Davidson and Woodward mention paralysis as possible sequela - Woodward reports 8 cases - I have never seen a ~~simple~~ SINGLE instance of it either in this hospital or in the military hospitals during the recent war.

DIAGNOSIS

The recognition of dysentery, in its usual form, does not as a rule present much difficulty, the frequency of the stools containing blood and mucus, the abdominal pain and tenesmus forming a group of symptoms which it is not easy to mistake. There are however certain diseases which may be mistaken for dysentery.

Local affection of the rectum and anus especially syphilis and epithelioma may cause considerable tenesmus and the passage of blood and mucus. The stools however as a rule contain much more faecal matter and a digital examination will at once clear up the diagnosis. Some of the very severe acute cases of dysentery with extensive ulceration and a high temperature may, especially if seen in the later stages when there may be only diarrhoea and no blood or mucus, be mistaken for enteric fever. In these cases there may be a history of blood and mucus being passed for the first two or three days but this may have stopped by the time the patient is seen. An interesting case of this nature came under my observation - A patient was admitted with a history of being ill for 5 days with dysentery passing 15-20 motions, containing blood and mucus, in the 24 hours. On admission he had diarrhoea - about 4 stools per day - but passed no blood or mucus, his tongue was furred, temperature ranged from 100.6 to 102.4

pulse 95 but rather weak, and no particular tenderness in the abdomen or tenesmus, He got worse, his temperature kept high and he died 4 days after admission, but during this period he never passed blood or mucus and his stools resembled those of enteric fever, which was prevalent at the time. On post mortem examination the whole of his large intestine was found to be one mass of ulceration only a few islands of mucous membrance remaining. This case shows how dysentery may be mistaken for typhoid for the patient undoubtedly died from a severe attack of dysentery, but during the time he was in hospital, had not one single symptom of that disease. A diagnosis however can usually be made by the small size of the spleen, the history of the passage of blood and mucus, by the agglutination of the dysentery bacillus by the blood serum and by Widals reaction.

ACUTE INTUSSUSCEPTION may be mistaken for dysentery as tenesmus and diarrhoea with blood and mucus are usually present. The age of the patient, the vomiting, its frequency, persistence and subsequent faecal character, The presence of a tumour and the greater collapse with a quick running pulse and no rise of temperature are usually sufficient to indicate intussusception.

ACUTE GASTRO-ENTERITIS is frequently mistaken for dysentery. This may be distinguished by the

history of the ingestion of some irritant. The sudden onset and vomiting and the indications of the involvement of the upper portions of the intestinal tract and the stools which are not as a rule typical of dysentery containing as they do a good deal of faecal matter and not much blood or mucus. If there is any doubt the agglutination reaction of the serum should be tested. For using the agglutination test, two or three strains of the bacillus should be kept - Shiga, Flexner's No. 11 and Strong Musgrove as frequently a serum will react well to one of these and not to another. In this country Shiga's bacillus is the most prevalent and hence the cultures of it are chiefly used for testing purposes.

MORTALITY & PROGNOSIS

The mortality of dysentery varies very much in different countries and epidemics.. Davidson gives figures varying from 3.3% in Martineque to 22.2% in Calcutta and 30% in Ceylon. This is of course chiefly amoebic dysentery. In Japan Shiga with bacillary dysentery states the mortality as being 26% - Sheube gives 7%. I have collected statistics from the two chief civil hospitals in the Transvaal, the statistics of the Health Department for this Colony are not reliable as many cases are not notified correctly, and also from

the returns of all the military hospitals. They are as follows;-

CIVIL HOSPITALS

	Dates	Cases		Deaths		Percentage mortality	
		European	coloured	European	coloured	European	coloured
Pretoria Civil Hospital	02	98	93	10		10.2	
	02-03	75		8	10	10.66	10.75
	03-04	74	98	11	15	14.86	15.30
	04-05	33	25	2	2	6.06	8.
Johannesburg Civil Hospital	02-03	101	54	11	22	10.89	40.74
	03-04	148	40	24	21	16.21	52.2
	04.05	75	25	20	9	26.6	36
Totals		604	335	86	79	14.23	23.58

MILITARY HOSPITALS

1903	454	15		3.30
1904	149	6		4.02
Totals	603	23		3.81

From these returns it is seen that the total mortality in 600 cases treated in civil hospitals was over fourteen per cent. while the military records of the same number of cases give a mortality of only 3.8 per cent. This marked difference is due to the fact that only the more severe forms of dysentery are admitted to the civil hospitals - in many instances the patients were almost moribund on admission - and also because in the army

any man who is not fit for duty has to go to hospital and consequently all the very mild cases were admitted which would, in civil life, be treated at home.

The native death rate is very high, 23.5 per cent, but I do not think that this indicates that the disease is more fatal in them for a Kaffir will not come into hospital unless he is extremely ill and so only very severe cases were admitted many of whom died within twenty-four hours of admission.

PROGNOXIS:

Mild cases, with only ten or fifteen motions in the 24 hours and not much abdominal pain or tenesmus, practically always recover in three or four days.

In the severe form with numerous motions great pain and tenesmus, and blood and mucus in the stools after the first week the prognoxis must be guarded. The mortality of these cases is high. - I have analysed a series of our cases in which the motions were above 20 in the 24 hours and where blood and mucus was present in the stools for more than eight days and the percentage death rate was twenty five.

Shreds of mucous membrane and portions of necrotic tissue are of serious import as denoting

the severity and depth of ulceration and if present would add considerably to the gravity of the prognoxis..

TREATMENT

This is a subject to which I have given special attention as I have had exceptional opportunities of trying the different methods in this hospital and in military hospitals.

There are four principal lines of treatment viz. (1) Saline purgatives (2) Ipecacuanha (3) Local applications (4) Antidysenteric serum.

Besides these there are of course numerous other drugs used some of which are undoubtedly of value in certain cases - these will be discussed later.

In India and the tropics there is a general concensus of opinion that Ipecacuanha is the best drug for the treatment of dysentery, some authors going so far as to describe its action as almost specific.

In South Africa there is, on the contrary, almost as general a concensus of opinion against this drug and in favour of the saline treatment. Ipecacuanha has been given a thorough trial here especially in the beginning of the war in military hospitals by surgeons from India and has

been found to be of practically no use and not to be compared with salines. It has been given up as a routine method in every civil hospital in this country.

The explanation of this discrepancy, in my opinion, has, by the researches of recent years, been shown to depend on the fact that there are really two separate diseases. In India and the tropics where ipecacuanha is so useful dysentery is due to the amœba and in South Africa and other countries it is due to the bacillus of dysentery. These organisms are quite different and it is therefore only natural that a separate remedy should be required for each.

In some instances of bacillary dysentery however ipecacuanha has been found useful and it should be given a trial when other methods fail. It should be administered as follows :-

No food is allowed for two or three hours, then twenty to thirty minims of the tincture of opium are given and a mustard leaf is applied to the epigastrium, these measures are for the prevention of emesis, half an hour afterwards from thirty to sixty grains of the drug are administered in the form of a bolus or pills. If the patient should vomit the dose is repeated in two hours. No liquids or food should be given for two or three hours after the administration of the ipecacuanha.

The Saline Treatment is the routine method employed in this hospital and in most of the other hospitals in this country. It is carried out as follows :-

On admission, if the case be in its earlier stages, one ounce of castor oil with twenty minims of tincture of opium are usually given. After three or four hours the administration of the saline is begun. One drachm of a saturated solution of Magnesuim Sulphate in Aqua Menth Piperita is given every half hour or sometimes two drachms every hour. This is continued from 6 A.M. to 8 P.M. and at the latter hour half a drachm of liquor morph mur, twenty minims of tincture of opium or ten grains of Dover's powder is given to be repeated in two hours if necessary. If the pain and tenesmus are severe hypodermic injections of morphia are used instead, up to half a grain which may have to be repeated.

Hot fomentations turpentine sturpes and sinapism are also used to assuage the pain. By these means the patient is enabled to obtain a little rest and probably some sleep which is of great importance.

The Magnesuim Sulphate is continued till the stools become clear, usually in two or three days after its commencement.

To check the diarrhoea which may persist for a few days bismuth subnitrate is given in full doses - thirty grains every three or four hours. In some

cases where this is not sufficient astringent mixtures catechu, kino etc. are administered and if there is any abdominal discomfort they are combined with ten or fifteen grains of tincture of opium.

Local Applications This would appear to be the most rational plan of treatment but the great obstacle to its general adoption is the intense pain, tenesmus, exhaustion and even collapse which follows any attempt to irrigate the colon especially if astringents are used.

The method employed is as follows :-

A half grain cocaine, or sometimes a half grain morphia, suppository is first introduced into the rectum to relieve the pain and tenesmus. The patients buttocks are well raised on a pillow and a rubber tube is inserted for a distance of about ten or twelve inches, perhaps more. The lotion at a temperature of about 103° F. is allowed to flow gently in and the patient is told to retain it as long as he can. Half to three quarters of a pint is quite enough lotion to use the first time and this may be increased after a day or two to three pints or even more if well borne. Usually the patients can only retain the lotion five or ten minutes and sometimes he is not able to retain it at all. This proceeding should be carried out twice a day, if tried oftener the patient may become greatly exhausted and may even collapse.

Various lotions have been used principally astringents e.g. alum, lead acetate, the sulphates of zinc and copper, silver nitrate, protargol, argyrol and silver compounds but I have found these of very little use early in acute cases for the pain caused by them is so great that they cannot be retained for any length of time and the patient is very much exhausted after their use. The astringents are much more serviceable later in acute cases, and from the first in chronic cases. Osler recommends in amoebic dysentery a solution of quinine 1 in 5000 to 1 in 1000. The solution which I have found most useful early in acute cases of bacillary dysentery is one containing sodium biborate, sodium bicarbonate and potassium chlorate. My reasons for using these drugs are that sodium bicarbonate and biborate have a sedative effect on the irritated mucous membrane of the colon and rectum and also they dissolve much of the mucus which sticks to the surface of the inner coat and so help to cleanse the interior of the gut and get rid of irritating substances. Potassium chlorate has a well-known cleansing action on unhealthy mucous membranes elsewhere e.g. in the throat mouth etc. and it appears to have a similar effect in dysentery.

The irrigation used contains 40 to 60 grains of each of these drugs to a pint of warm water, one to two pints or more of it are used twice a day as

described, usually with distinctly beneficial results the blood and mucus being decreased and the tenesmus and pain diminished. This lotion causes practically no discomfort and can be given and will be retained for some time in acute cases when any astringent lotion would be ejected at once and cause a great deal of pain and exhaustion.

After using this lotion for two or three days and so cleansing the mucous membrane and getting it into a less irritable condition I then use a five or ten grain solution of silver nitrate or one of its derivatives, e.g. protargol half per cent or argyrol. It is found that these silver solutions can be much better borne after the use of the former alkaline lotion. The silver solutions are I think the best of the astringents and of the salts argyrol is to be preferred as it is less irritating.

The results of using this astringent irrigation are often very good - the blood always decreases and usually disappears entirely in a day or two and the mucus as a rule gets very much less. In some instances however it is disappointing as, even after the use of the alkaline irrigation, it causes so much pain and exhaustion that its use has to be discontinued. In these cases I resort again to the alkaline solution and continue it for some days till the more acute symptoms subside and then the silver may be tried again.

The irrigations are stopped as soon as the stools become clear of blood and mucus and if diarrhoea continues bismuth subnitrate or astringents are used as before.

It must be noted here that after an acute attack of dysentery the patient is very apt to become constipated. This must be carefully guarded against for if the constipation be allowed to persist for two or three days a relapse of the dysentery will in all probability follow. Any aperient may be given regularly. I have found half an ounce of castor oil the most useful.

Anti dysenteric Serum. There is practically no doubt now that anti-dysenteric serum, prepared by innoculating horses with killed cultures of the dysentery bacillus over long periods, is a specific remedy for the bacillary form of dysentery and in the future it will, in all probability, be used as a routine method just as anti-diptheritic serum is used now. It has been tried and reported on favourably by many observers.

Shiga claims to have reduced the mortality to one third of that of cases treated otherwise.

Kruse has used it and reports favourably also.

Rosenthal has published his experience with this remedy as follows - in 157 patients into whom it was injected the mortality was half that of the controls. He states that it acts beneficially in all

cases, whether given early or late, and ameliorates all the symptoms, the course of the disease being shortened and very rarely becoming chronic. If injected at an early date the disease was aborted in one or two days. As a rule the blood and mucus disappeared and the tenesmus became much diminished in from twenty four to forty-eight hours, the improvement beginning about twenty hours after the injection.

Unfortunately we have not been able to give this remedy a thorough trial as there have been remarkably few cases of dysentery of the severe type in our district during the last twelve months. I have collected the results of 17 cases in which the serum was used.

All of these cases were of the severe type and the results were uniformly good with one exception - a kaffir who was in a greatly debilitated condition when admitted and, though the blood and mucus stopped 48 hours after an injection of the serum, he died from exhaustion on the third day.

In the other sixteen cases the following points were noted :-

As a rule improvement rapidly followed the injection of 20 c.c. of the anti-dysentric serum - within 24 hours the tenesmus was greatly relieved, the blood became more clotted and both it and the mucus were much diminished in amount and the patient obtained a good rest. Later the blood disappeared altogether

the mucus diminished still more and faceal matter appeared in the stools. Within three days the motions in the majority of cases were almost normal and if not, simply like those of ordinary diarrhœa. Usually one injection was enough but in four of these cases which were very severe and did not improve much after the first injection a second was given and improvement rapidly followed.

In only two of the cases which were very severe from the outset did blood and mucus remain in the stools for 48 hours after the first injection.

In several cases there was a reactionary rise of temperature with headache about six to twenty hours after the injection and in one case delirium. This re-action only lasted eight to twelve hours and caused very little inconvenience to the patients.

In five cases a rash resembling measels but very irritating broke out about a week after the injection. It was relieved by gr XXX doses of Calcium chloride and rapidly disappeared.

The serum used was obtained from the Lister Institute of Preventive Medicine.

On the whole as far as one can judge from these few cases this serum has acted very well but of course it is impossible to place too much reliance on the results of such a limited trial. It must be remembered, however, as stated above that the serum was only given to cases of the severe type in which the

mortality had always been found to vary from twenty to thirty per cent or even higher before the introduction of this remedy.

Besides the drugs already mentioned there are a great number which have been used in the treatment of dysentery. Many of them have been vaunted as certain cures but when extensively tried have been found of little use. This is doubtlessly due to these drugs having been tried in a series of mild cases which would have improved almost as quickly without any medicinal treatment.

Of these drugs Bismuth either as the sub-nitrate or carbonate is one of the most useful. It acts by forming a coating over the ulcerated surfaces and so protecting them from the irritating intestinal discharges and faecal matter. This action of bismuth was strikingly demonstrated in one of my cases in which I had been giving it in full doses (gr XXX three hourly.) On post-mortem examination it was found that practically the whole of the large intestine was affected but the ulcers were almost completely covered by a coating of black sulphide of bismuth which had formed a very efficient shield for them. The bismuth had apparently stuck to the rough surface of the ulcers as there was very little on the rest of the mucous membrane. This drug is, as might be expected, found

specially useful when the acute stage is over for, by forming this shield, it protects the ulcers and so gives them a much better chance of healing. I am doubtful if it should be used at all in the early stages for then it might prevent the bacteria and toxines from escaping by this action of forming a coating and so do harm. It has also antiseptic properties and is slightly astringent especially the subnitrate.

It should be given in full doses from half a drachm every four hours to half a drachm every two hours. Small doses are not much good for then enough of the drug does not reach the large intestine to form a sufficient coating to the ulcers.

Hamamelis

This drug has been found very useful in these cases in which there is an unusual amount of haemorrhage. It must be given in large doses, the B.P. dose of the liquid extract is 5 to 15 minims but this amount is quite useless. We give up to two drachms of this preparation every two hours and I have never seen any toxic effect from this large dose.

Sulphur has been given a thorough trial but I cannot say that it has proved very satisfactory. We usually employ fifteen grains of it in the less acute stages combined with five grains of Dover's powder and in some cases it has appeared to have

acted beneficially. It is no use in the acute stage of the severe cases. Douglas in the Dublin Medical Journal of April '03 speaks highly of this remedy.

Quinine is highly spoken of by some writers, Gemmel especially recommends its use. We have not found it of much service though it has a beneficial affect on these cases with a high temperature, it should be given in five grain doses four hourly. It is of course very useful in those cases which are complicated by malaria.

Calomel is largely prescribed in some countries especially in Germany; it is used till salivation appears. It has not been found to be of much service in this country.

Tincture of Monsonia made from the Monsonia Ovata, a South African plant grown on the high veldt only. This preparation has been very favourably reported on by Dr Maberley (Lancet 6-2-1897) for both acute and chronic cases. We have tried it in seven cases both acute and chronic and have found no improvement after its use in any instance.

Liquor Pelli made from the root of the wild geranuim has a local reputation in the Transvaal. We have tried it in fourteen instances. The results have not been good though it appears to be beneficial in certain chronic cases.

Simarubra (Ailanthus Glandulosa) is used largely in

the East by "dysentery doctors", it is of no use in South Africa.

Catechu, Kino, Krameria, Acid Gallic and other astringents we have found useful, especially in combination with opium and perhaps with bismuth, in some chronic cases or in the diarrhoea following the acute attack. They must be given in full doses.

Many intestinal antiseptics have been said to be beneficial in dysentery e.g. salol, beta-napthol, calomel, salicylate of bismuth and many others. The doses of these drugs that can be given by the mouth is so small that the amount which reaches the lower bowel is totally inadequate to exert any local antiseptic effect on the ulcers and I have found them of no practical value.

Acetozone a highly spoken of remedy I have tried but without much success.

Izal has been highly recommended by Major Vaughan I.M.S. for tropical (amœbic) dysentery. He states that it has a local antiseptic effect and can be detected in the stools. He gives it in fifteen or twenty minim doses every four hours. I have tried it in several cases in this country but have not found any benefit from its administration.

Rest and Diet

Perfect rest is of the greatest importance in the treatment of dysentery, many of the milder cases will get better simply with rest and diet.

The patient must be put to bed and not allowed to raise himself in any way. In the very severe cases it is better not to use the bed-pan but to let the motions be passed into cotton wool or tow, for the frequent shifting of the patient on and off the bed-pan disturbs him very much.
To obtain rest during the night and if possible some sleep sedatives must be employed as a rule, often in fairly large quantities - a quarter of a grain of morphia two hourly for three injections or twenty to thirty minims of tincture of opium repeated if necessary three times with an hour or two hours interval, or perhaps ten grains of Dover's powder, repeated if required, are the usual remedies employed in this hospital. In some cases however even larger doses of these drugs are required to insure some rest and sleep.
I am aware that many authorities state that opium and morphia should not be used because of their depressing influence but I have always found that this depression is more than counteracted by the benefit which accrues to the patient as the result of a good night's rest obtained by these means; for not only is the patient benefitted generally thereby but the local conditions are improved by the rest obtained from the temporary relief of the tenesmus thus procured.
Hot fomentations or turpentine stupes are often

very useful in allaying the pain and they of course may be used continually during the day-time when sedatives ought not to be employed for they should be reserved for the night.

It is essential that the patient should be kept warm especially during the cold nights which are so common out here. A flannel binder will frequently be found to be very useful for this purpose.

The diet is of the greatest importance, it must be light and very easily digested so that it will leave little residue which would disturb the lower bowel.

Milk, is, as a rule, the best diet. It is a good plan to mix it with about equal parts of or one-third part of lime water - this prevents large curds being formed and the lime acts as a mild astringent and has a soothing influence on the inflamed mucous membrane. If in spite of this curds are seen in the stools, which should be examined frequently, the milk must be peptonized. About ten feeds should be given in the twenty-four hours, two hourly during the day and three hourly in the night, each feed consisting of about 5 or 6 ounces of milk and four ounces of lime water - thus about three pints of milk are given in the twenty-four hours. In addition to the milk it is well to add some of the meat juices, raw meat juice made from fresh beef steak is the best but

if this cannot be obtained Brand's Essence of beef will be found a useful substitute. Beef tea and bovril are contra-indicated, they seem to have a very irritating affect on the lower bowel and usually aggravate the pain and tenesmus.

In many cases however it will be found that the milk even when peptonised is not well borne causing a feeling of nausea and abdominal discomfort: the presence of curds in the stools shows that it is not being digested. In this case it should be stopped and egg albumin rice and barley water and a little farinaceous food, e.g. Benger's or Mellin's foods, substituted. Whey and plasmon are also useful substitutes for milk.

If stimulants are required alcohol in the form of brandy half to one ounce every three hours is one of the most efficient.

Digitalis and strophanthus may be indicated, of the two I prefer the latter as it does not disturb the digestive functions as much as the former.

If there is much haemorrhage, however, digitalis should be used as it tends to contract the peripheral arterioles and so, though it raises the blood pressure, does not tend to increase the bleeding.

Treatment of the Convalescent stage.

When the patients become convalescent a light nourishing diet should be given with eggs, fish or chicken after a few days but red meat should not be

allowed for a week or ten days after the stools have become normal. The tongue is a very good guide for the amount of food, if it is clean almost anything can be allowed even though the dysenteric stools have only ceased for a day or two. Convalescence is usually rapid and the patient can as a rule get up six or seven days after even a severe attack. One point of great importance is to see that the bowels are moved every day. Patients frequently become constipated after dysentery and if this is allowed to continue a relapse is very likely to occur. Half an ounce of castor oil given early in the morning is the best aperient but if this causes much nausea a dose of salts or apenta water may be substituted.

Tonics as iron arsenic and quinine etc. will be found beneficial.

Treatment of Chronic Dysentery.

These cases though fortunately not very common in the bacillary form of dysentery are very troublesome when they do occur.

Rest and diet are of the greatest importance. The patient should be put to bed and care taken that he is kept warm and not exposed to any chills. His diet should consist of milk, whey, egg-albumin, plasmon, Benger's or Mellin's foods, bread and milk, lightly boiled eggs and egg-flips, well cooked ground rice and milk puddings. This food must be

given at regular times and the intervals between feeds should not be too long - 3 or 4 hours is enough.

In some cases fruit and well cooked fine vegetables may be given in moderation and are often beneficial. Irrigations are in these cases often of the greatest service. They should be given in the manner already described beginning with the alkaline solution followed by the silver. They must be thoroughly carried out - given twice daily and retained as long as possible. Silver solutions are specially useful; the risk of argyria is infinitesmal; as far as I know it has never followed the prolonged use of silver in these cases. I have never seen an instance nor a report of one.

Of the drugs bismuth is one of the most useful, it should be given in full doses - gr XXX four hourly and may in the evenings be combined with a little opium.

Liquor Pelli as already mentioned I have found useful in some of these cases - it is given every two hours in milk.

Sulphur and astringent mixtures are sometimes beneficial; they should always be given a trial when other remedies fail.

When allowed out of bed the patient must be very careful not to get cold. The clothing should be warm and it is frequently found that the wearing

of a "cholera belt," i.e. a flannel band six to eight inches in width wrapped round the waist, is very beneficial.

Sometimes these measures are of no avail and the patient, though he may improve for two or three days, is continually getting relapses. In a case of this description a thorough change of climate should be recommended. A month at the sea-side or a sea voyage will often affect a complete cure.
